HIGH SCHOOL AND UNIVERSITY
MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1929.

GEOMETRY 3.

Time — Three hours.

Values.

4 **1.** (*a*) The coordinates of the ends of the base of a triangle are $(-2, 3)$ and $(4, -1)$ and the length of the median drawn to the base is 6. Find the equation of the locus of the vertex.

7 (*b*) Find the equation of a straight line in terms of the length of the perpendicular upon it from the origin, and the angle the perpendicular makes with the axis of x.

4 (*c*) Change the equation $3x + 4y = 12$ to the form obtained in (*b*).

2. Attempt *three* parts only.

6 (*a*) Three vertices of a parallelogram are $(3,4)$, $(-3,1)$ and $(5,-2)$. Find the coordinates of the fourth vertex.

6 (*b*) Find the area of the triangle made by the axes and the line through $(-3,-4)$ and $(-8,7)$.

6 (*c*) Find the equation of two lines passing through $(2,-5)$ one of which is parallel and the other perpendicular to $x - 2y - 10 = 0$.

6 (*d*) Find the equation of the straight line passing through the intersection of $y = 7x - 4$ and $y = -2x + 5$ and making with the axis of x an angle of 60°.

URRICULUM
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URR HIST

Values.

3. Attempt *three* parts only.

6 (*a*) Find the equation of the tangent to the circle $x^2 + y^2 = r^2$ at the point (x_1, y_1).

6 (*b*) A circle passes through the origin and the point $(9,3)$ and has its centre on the line $x - y = 0$. Find its equation.

6 (*c*) Find the length of the tangent drawn from the point $(-3, -7)$ to the circle $x^2 + y^2 - 4x - 10y = 17$.

6 (*d*) Find the equation of the circle having for its centre the point $(5,3)$ and touching the line $4x + 3y - 70 = 0$.

4 **4.** (*a*) What is the latus rectum of the parabola $2y^2 = 3x$?

What is the equation of the directrix of this parabola?

7 (*b*) Find the locus of the point of intersection of two tangents to the parabola $y^2 = 4ax$ which are at right angles to one another.

5. Attempt *one* part only.

5 (*a*) Find the equation of the parabola if the equation of a tangent to it is $4y = 3x - 12$.

5 (*b*) Find the equation of the straight line that touches the parabola $y^2 = 12x$ and makes an angle of 45° with the line $y = 3x - 4$.

7 **6.** (*a*) Show that the sum of the focal distances of any point on the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$$

is constant and equal to $2a$.

7 (*b*) Show that the locus of the foot of the perpendicular dropped from either focus of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ on a tangent is a circle on the axis major as diameter.

Values.

7 **7.** The equation of an hyperbola is $9x^2 - 16y^2 = 144$; find the axes, distance between the foci, the eccentricity and the latus rectum.

8. Attempt *two* parts only.

6 (*a*) Find the equations of the tangents to $4x^2 + 9y^2 = 25$ which are parallel to the line $x + 2y - 7 = 0$.

6 (*b*) The foci of an ellipse are (3,4) and (9,4) and the ellipse is tangent to the x-axis at the point (6,0). Find its equation.

6 (*c*) Prove that at any point on the parabola $y^2 = 4ax$, the tangent bisects the angle between the focal distance and the perpendicular on the directrix.

100

$y^2 = 12x$

$y = 3x - 4$

$3 - 1 . \quad 1 = \frac{3 - m}{1 + 3m}$

$1 + 3m = 3 - m$

$4m = 2$

$m = \frac{1}{2}$

$1 = \frac{m - 3}{1 + 2m}$

$1 + 2m = m - 3$

$2m = -4$

$m = -2$

$y = -2x - \frac{3}{2}$

$2y = -2x - 3$

$2x + 4y + 3 = 0$

$y = mx + \frac{a}{m}$

$y = -\frac{1}{2}x + 6$

$2y = -x - 12$

$x + 2y + 12 = 0$

1881

850

831

Ex libris
UNIVERSITATIS
ALBERTAENSIS

QUAECUMQUE VERA